

WE CLAIM:

1           1.    A fuel injection valve for injecting fuel into  
2   the combustion chamber of an internal combustion engine,  
3   said fuel injection valve comprising:  
4           a valve body having a tip, said tip containing  
5   injection orifices and a valve needle, said valve needle  
6   disposed in an axially displaceable manner in the valve  
7   body for opening and closing the injection valve, and a  
8   cone located at the tip of the valve needle for  
9   selectively blocking a fuel path to the injection  
10   orifices, wherein each injection orifice has a respective  
11   groove-shaped recess in the tip of the valve needle.

1           2.    A fuel injection valve according to Claim 1,  
2   wherein each recess has a width which corresponds at  
3   least to a diameter of an injection orifice.

1           3.    A fuel injection valve according to Claim 1,  
2   wherein each recess has a stepped contour.

1           4.    A fuel injection valve according to Claim 3,  
2   wherein each recess has a curvilinear cross-section.

1           5.    A fuel injection valve according to Claim 1,  
2   wherein the nozzle needle has a guide for reducing  
3   rotational movements.

1           6.    A fuel injection valve according to Claim 5,  
2   wherein the guide is a slot-and-key guide.

1           7.    A fuel injection valve according to Claim 5,  
2    wherein a featherkey engages in a needle guide of the  
3    valve needle in a guide groove in a hollow cylindrical  
4    guide surface in the valve body.

1           8.    A fuel injection valve according to Claim 5,  
2    wherein the guide is a longitudinal guide.

1           9.    A fuel injection valve according to Claim 1,  
2    wherein each recess has an arched contour.

1           10.   A fuel injection valve according to Claim 9,  
2    wherein each recess has a semicircular cross-section.

1           11.   A fuel injection valve according to Claim 1,  
2    wherein the recesses of the injection orifices are  
3    adapted to compensate for asymmetrical flow conditions.

1           12.   A fuel injection valve according to Claim 1,  
2    wherein the recesses are of triangular cross-section.

1           13.   A fuel injection valve according to Claim 1,  
2    wherein a bottom edge of each recess lies at  
3    approximately the same height as a bottom edge of each  
4    orifice.